

Appln. No. 10/574,197
Amdt. dated September 17, 2009
In reply to the Office Action of March 17, 2009

AMENDMENTS TO THE DRAWINGS:

The attached drawing sheet includes changes to Figure 3. This sheet, which includes Figure 3, replaces the original sheet for Figure 3.

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REMARKS

Favorable action on the merits is solicited in view of the foregoing amendments and the following remarks.

I. Claim Status and Amendments

Claims 13-26 are pending in this application.

Claims 13-21 have been examined on the merits and stand rejected. Claims 1-13 were previously cancelled. Claims 22-26 are withdrawn as non-elected subject matter. No claims have been allowed.

By way of the present amendment, Applicants have amended the claims in a non-narrowing manner to address formal matters raised by the Examiner and to make minor editorial revisions to better conform to U.S. claim form and practice. Such revisions are unrelated to patentability. The revisions are non-substantive and not intended to narrow the scope of protection. Support can be found in the original claims as filed. No new matter has been added.

New claims 27 and 28 have been added that incorporate substance removed from claims 15 and 19, respectively, to which the new claims depend.

Claims 13-28 are pending upon entry of this amendment. The claims are believed to define patentable subject matter warranting their allowance for the reasons discussed herein.

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The specification has been amended to include section headings where appropriate. No new matter has been added.

A new drawing figure is being submitted to replace Figure 3. Support can be found in original Figure 3. No new matter has been added.

II. Objections to the Drawings

The Examiner objected the drawings on the basis that Figure 3 does not contain a legend labeling it as "Prior Art." See page 3 of the Office Action.

The present amendment overcomes this objection by replacing original Figure 3 with a new figure that contains the correct designation. Withdrawal of the objection is requested.

III. Objections to the Specification

The specification was objected for not containing appropriate section headings as set forth on page 4 of the Office Action.

The present amendment overcomes this concern by amending the specification, where appropriate, to include section headings and to conform to U.S. practice. Thus, withdrawal of the above objection is solicited.

IV. Indefiniteness Rejections Under 35 U.S.C. § 112

Claims 13-21 were rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for the reasons on pages

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5-6 of the Office Action. This rejection is respectfully traversed, as applied to the amended claims and for the following reasons.

With respect to the Examiner's concern over the term "substrate", it should be noted that "substrate" denotes a medium containing a compound the metabolic conversion of which is envisaged, as discussed at page 7, lines 19-31 of the disclosure. Said substrate corresponds to the domestic sewage, industrially polluted water, effluents . . . that is treated in the bioreactor vessel.

As set forth by the Examiner, claims 15 and 19 also refer to some "substrate". However said expression is misused in these claims as referring to the culture medium found in the automated selection device under (24) as illustrated in Fig.3. It seems that confusion has occurred between the substrate present in the reactor vessel (1) and the culture medium (24), which is used in the automated selection device. In fact, the term "substrate" has been erroneously used in claims 15 and 19, whereas mention of (24) is inappropriate in the preamble of claim 13.

The substrate, which contains various populations of living cells, is not treated in sterile conditions. By contrast, the culture medium (24) used in the automated selection device has to be sterile.

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Therefore the "substrate" shall not be confused with the "culture medium" (24). The claims have been amended in a manner believed to make this clear. Applicants have amended claims 13-21 in a manner believed to make clear that in the claimed method, the culture medium in the automated device is distinct from the substrate in the bioreactor vessel.

Also, the objected expressions "*such as*", "*in particular*" and "*for example*" have been removed from the claims.

The amended claims are thus clear, definite and have full antecedent basis. This rejection is believed to be overcome, and withdrawal thereof is respectfully requested.

V. Obviousness Rejections Under 35 U.S.C. § 103(a)

Claims 13-21 have been rejected under 35 U.S.C. § 103(a) as being obvious over WO 00/34433 (as cited in the IDS of 3/31/06, the English language equivalent being MUTZEL et al. (US 6,686,194)) for the reasons on pages 7-10.

Claims 13-21 have been rejected under 35 U.S.C. § 103(a) as being obvious over WO 00/34433 (the English language equivalent being MUTZEL et al. (US 6,686,194)) in view of HAWKINS (US 5,624,563) for the reasons on pages 10-14.

These rejections are respectfully traversed.
MUTZEL et al.

In the Office Action, the Examiner first rejected the claims as being obvious in view of MUTZEL et al., which

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describes the automated device for selecting the cells proliferating in suspension. Applicants disagree.

To start, it is acknowledged that MUTZEL et al., referred to in the present application, describes step c) of the claimed method and the automated device useful thereto. However, Applicants fully disagree that MUTZEL et al. specifically teaches means making it possible for transferring the cells from the selection device to the vessel/tank and vice-versa, as asserted by the Examiner.

The Examiner's assertion is based on portion 36 of the figures 1 to 16 and column 4, lines 30-42 in MUTZEL et al. However, these figures and passage neither describe other devices as the automated device, and even less a non sterile bioreactor vessel.

Portion 36 corresponds to an output conduit of the automated device comprising a valve, which is used for:

- completely emptying one of the two culture vessels (col.4, line 33); or
- discharging the culture outside (col. 5, lines 43 and 65) the automated device;
- removal of the used medium (col. 5, line 55-56); and
- flushing medium (col. 5, line 34-35) outside the culture vessels.

Given the fact that, according to MUTZEL et al., the apparatus must operate autonomously over an unlimited time

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period under the regulatory delivery of liquids and gas (liquids, air, nutrient media) (col. 2, line 14), the output conduit 36 must be viewed as an evacuation to discharge surplus sterilizing agent or washing solutions (see col.4, line 25).

Such an output conduit is generally connected with a refuse bin, and thus, there is no explicit or implicit teaching to connect said apparatus with a bioreactor by the output conduit 36. Indeed, the Examiner seemingly acknowledges this fact on page 8 in the Office Action, wherein he concludes that: "Mutzel does not expressly teach in a single embodiment a bioreactor connected to the selection device".

In fact, MUTZEL et al. only teaches to connect the described automated device with another such automated device:

If necessary, a plurality of these apparatuses can be combined with each other, such that the content or part of the content of one apparatus can be transferred into another apparatus (col. 2, lines 17-20)

Moreover, the present invention is not limited to the use of two culture vessels 4 and 6, but also more culture vessels can be arranged e.g. they can be connected in series and/or in parallel, so that a plurality of first culture vessels 4, and a plurality of second culture vessels 6, are present (Emphasis added) (junction col.5-6)

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Based on such, it should be clear that there is no explicit or implicit teaching to connect said apparatus with a bioreactor by the output conduit 36 in MUTZEL et al.

Furthermore, it would not have been obvious for one skilled in the art to connect the device described in MUTZEL et al. to a non sterile bioreactor to arrive at the claimed method, at least for the reasons set forth below.

First, MUTZEL et al. does not describe a method for treating effluents in a non sterile open bioreactor vessel. Instead, MUTZEL et al. describes a selection apparatus that is run under sterile conditions:

A dilution resistant variant must not be allowed to accumulate in any part of the apparatus. Its function is assured by controlling streams of liquid (fluidics). Under the prerequisite that the regular delivery of liquids, such as, e.g. nutrient media, washing solutions and a continuous supply with sterile gas (...) (col.2, lines.7-12)

To stress this contrast between the selection device and the bioreactor vessel, claim 13 has been amended to specify that the bioreactor vessel where the substrate is treated is non sterile, and to specify that in step c) that the proliferation cells are selected under sterile conditions.

Second, MUTZEL et al. discloses only at least one confined apparatus, which is only supplied with sterile gas, fresh medium and air. This is not the case according to the

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claimed method, since the automated selection device in step c) is periodically supplied with living cells C1 sampled from the non sterile bioreactor vessel.

Also, in the claimed method, the microbial diversity, which is introduced into the automated device, varies over time. By contrast, in MUTZEL et al. the selection is limited to variants of one initial inoculant.

Third, MUTZEL et al. does not suggest treating any substrate outside the described automated device, and even less under conditions where static cells can develop. Indeed, MUTZEL et al. recites on col.2, lines 31-34:

This course of actions makes sure (i) that the population of organisms in suspension is maintained at any time (ii) that all dilution-resistant variants in any part of the apparatus are destroyed during any one of the cycles (emphasis added).

By contrast, by following the claimed method, the substrate is treated in a non-sterile bioreactor vessel, where static variants as part of the various populations of living cells C1 can develop in mixture with the selected suspension cells C2 (see step a) and e) in claim 13).

Fourth, MUTZEL et al. does not teach to alternate sterile and non sterile conditions (discontinuous selection pressure).

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As indicated above, the living cells in MUTZEL et al. are submitted to a continuous pressure of selection in order to select proliferation cells.

However, the instant claimed method alternates steps where cells are kept under sterile conditions (step c)) and steps where cells (steps a) and e)) are left to develop under non sterile conditions.

In contrast to MUTZEL et al., the selection pressure in the claimed method is discontinuous.

Thus, to combine the different steps as claimed would be unpredictable from the disclosure in MUTZEL et al. For this reason, it is believed that the claimed method is novel and unpatentable over MUTZEL et al.

Finally, the automated device of the claims does not have the same technical effect as in MUTZEL et al.

According to MUTZEL et al., variants that proliferate in suspension are selected, excluding those that may develop under static forms. This leads to a reduction in the initial biodiversity present in the device.

By contrast, according to the claimed method, biodiversity is promoted in the bioreactor vessel and the substrate contains various populations of living cells C1. The automated device is used for "sorting" and amplifying the suspension cells contained among living cells C1. In step e), C1 and C2 cells are mixed together, so that the initial

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biodiversity present in the substrate is not reduced. This stands in contrast to MUTZEL et al. The static forms remain in the substrate until they give rise to suspension forms, at a given stage of the substrate treatment, which are then amplified by the selection device.

In turn, the combination of the steps of the claimed method tends to enlarge the biodiversity of the living cells present in the substrate, which is contrary to the teaching of MUTZEL et al.

For these reasons, there would be no reasonable expectation of success in utilizing and/or modifying the device and procedures in MUTZEL et al. to arrive at the claimed method. As such, the teachings in MUTZEL et al. are clearly not predictive of the claimed method. It is thus apparent that one skilled in the art would not arrive at the claimed method based on the disclosure in MUTZEL et al.

In view of the above, it should be clear that MUTZEL et al. fails to disclose or suggest each and every element of the claims. Further, no rationale has been provided to modify the teachings in MUTZEL et al. to meet each and every element of the claims in a predictable manner. Indeed, as discussed above, the teachings in MUTZEL et al. are clearly not predictive of the claimed method. For these reasons, independent claim 13 is believed to be novel and patentable over MUTZEL et al. Claims 14-21 depend, either directly or

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indirectly on claim 13. Thus, these claims are believed to be novel and patentable over MUTZEL et al. for the same reasons in view of their dependency on claim 13.

Therefore, the obviousness rejection over MUTZEL et al. is untenable and withdrawal thereof is requested.

MUTZEL et al. in view of HAWKINS

The obviousness rejection of the claims over MUTZEL et al. in view of HAWKINS is respectfully traversed for the same reasons set forth above with respect to MUTZEL et al., which are reiterated herein by reference, and for the following reasons.

Observing that "Mutzel does not expressly teach in a single embodiment a bioreactor connected to the selection device", the Examiner has combined MUTZEL et al. to another document HAWKINS. Applicants respectfully disagree and submit that HAWKINS fails to remedy the above-noted deficiencies in MUTZEL et al.

HAWKINS teaches a process and apparatus for treatment of wastewater in a non sterile environment. HAWKINS aims at maintaining proper concentration of bacteria during waste water treatment and insuring the continuous presence of bacteria.

In this respect, HAWKINS provides with solutions for insuring continuous bacteria, such as:

- aerating the substrate (i.e. mechanically improving the living cells culture conditions);
- creating successive treatment zones, through which the waste water passes, that correspond respectively to different bioconversion steps (i.e. promoting specific culture conditions);
- transferring mixed liquor from one treatment zone to another (i.e. increasing cell concentration).

However, Applicants respectfully submit that these solutions are very remote from and not suggestive of the claimed method.

Further, it should be noted that HAWKINS does not teach to select cells under proliferation state, as required by the claims.

Also, HAWKINS does not suggest combining the disclosed apparatus for treatment of wastewater with an automated device run under sterile conditions, as required by the claims.

Further, no rationale has been provided to modify and combine the teachings in MUTZEL et al. with those in HAWKINS in a predictable manner to meet each and every element of the claims.

For these reasons, it is believed that HAWKINS fails to remedy the above-noted deficiencies in MUTZEL et al. Thus, no combination of MUTZEL et al. and HAWKINS would result in

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each and every element of claim 13. Therefore, independent claim 13 is believed to be novel and patentable over the combination of MUTZEL et al. and HAWKINS. Claims 14-21 depend, either directly or indirectly on claim 13. Thus, these claims are believed to be novel and patentable over the combination of MUTZEL et al. and HAWKINS for the same reasons in view of their dependency on claim 13.

Therefore, the obviousness rejection over MUTZEL et al. and HAWKINS is untenable and withdrawal thereof is requested.


VI. Conclusion

Applicants believe that all issues raised in the Office Action have been addressed above in a manner that should lead to patentability of the present application. Favorable consideration and allowance are respectfully requested. If the Examiner has any comments or proposals for expediting prosecution, please contact the undersigned attorney at the telephone number below.

Respectfully submitted,

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APPENDIX:

Attachment: Replacement Sheet for Figure 3.